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CONCERNING THE NUPTIAL PLUMES WORN BY
CERTAIN BITTERNS AND THE MANNER IN
WHICH THEY ARE DISPLAYED.

BY WILLIAM BREWSTER.

CHIEF among the natural attractions of Concord, Massachusetts, is its charming little river, known as the Sudbury above the point where, near the village center, it unites with the Assabet, and below this as the Concord. The Indians called it the Musketequid or Grass-grown River, a name not less appropriate than euphonious, for its sluggish waters abound in aquatic or semi-aquatic vegetation and its banks are fringed with wild grasses and sedges which stretch for miles along one or both sides of the placid, sinuous stream and in places also extend back to a greater or less distance over low, flat lands wet at all seasons and regularly inundated in early spring. These fresh-water marshes are of vast extent in Sudbury and Wayland and they cover hundreds of acres in the eastern part of Concord where they have been known, ever since the first settlement of the town, as the Great Meadows and where I am especially familiar with them for I am accustomed to spend much time in spring and autumn at a camp on Ball's Hill that directly overlooks them. Among the birds which frequent them at these seasons and in summer, the American Bittern is one of the commonest and most conspicuous as well as most interesting. I have had so many opportunities of watching it here and elsewhere that I had come to doubt if there could be anything more of importance for me to learn regarding its life history when, only last April, I was not a little surprised — and also a bit humiliated — to find that during the mating season the male bird indulges in certain odd and interesting displays of plumage of which I had been wholly ignorant. The following account of this experience is taken, with few changes, from my journal where I wrote it out in full just after making the observations to which it relates.

Concord, Massachusetts. April 17, 1910. Brilliantly clear and bracingly cool with strong, keen east wind.

The marsh on the south side of the river opposite Ball's Hill

looks, at present, almost as smooth and verdant as a well kept lawn. It was mown over late last summer and having been free from flood water for upwards of a month past, is now covered everywhere with young grass three or four inches in height. Although this affords no concealment for birds larger than a Snipe the marsh has been frequented much of late by Bitterns. At morning and evening I have heard them pumping or have seen them flying to and fro, or standing erect with heads and necks stretched up on the watch for danger, but previous to to-day I have paid little attention to them. Two which I saw this morning, however, presented such a strange appearance and acted in so remarkable a manner that I watched them for half-an-hour or more with absorbing interest. When I first noticed them they were on the further margin of a little lagoon where Red-winged Blackbirds breed, moving past it eastward almost if not quite as fast as a man habitually walks, one following directly behind the other at a distance of fifteen or twenty yards. Thus they advanced, not only rapidly but also very evenly, with a smooth, continuous, gliding motion which reminded me of that of certain Gallinaceous birds and was distinctly un-heron-like. Occasionally they would stop and stand erect for a moment but when walking they invariably maintained a crouching attitude, with the back strongly arched, the belly almost touching the ground, the neck so shortened that the lowered head and bill seemed to project only a few inches beyond the breast. In general shape and carriage, as well as in gait, they resembled Pheasants or Grouse much more than Herons. But the strangest thing of all was that both birds showed extensive patches of what *seemed to be pure white* on their backs, between the shoulders. This made them highly conspicuous and led me to conclude at first that they must be something quite new to me and probably — because of their attitudes and swift, gliding movements — Pheasants of some species with which I was unfamiliar. Thus far I had been forced to view them with unassisted eyesight, but when I had reached the cabin and they the edge of our boat canal directly opposite it I got my opera glass and by its aid quickly convinced myself that despite their unusual behavior and the white on their backs they could be nothing else than Bitterns.

I was now joined by Miss E. R. Simmons, Miss Alice Eastwood (the California botanist) and my assistant Mr. R. A. Gilbert, all of whom became at once deeply interested in the birds which had stopped and were standing erect by the canal about twenty yards apart. Suddenly both rose and flew straight at one another, meeting in the air at a height of four or five feet above the marsh. It was difficult to make out just what happened immediately after this but we all thought that the birds came together with the full momentum of rapid flight and then, clinching in some way, apparently with both feet and bills, rose six or eight feet higher, mounting straight upward and whirling around and around, finally descending nearly to the ground. Just before reaching it they separated and sailed (not flapped) off to their former respective stations. After resting there a few minutes the mutual attack was renewed in precisely the same manner as at first only somewhat less vigorously. It was not repeated after this. Although a most spirited tilt (especially on the first occasion), by antagonists armed with formidable weapons (the dagger-like bills), we could not see that any harm resulted from it to either bird. When we crossed the river in a boat some fifteen minutes later both Bitterns were still standing near the canal. Up to this time both had shown the white continuously but it *disappeared* as we were approaching them. One took flight when we were in the middle of the river. We got within twenty yards of the other before it moved and then it merely walked off over the marsh.

Concord, April 18, 1910. Cloudy with fine, steady rain. Forenoon cool with chill east wind; afternoon warm with light south wind.

A close watch was kept for the Bitterns during the forenoon but nothing was seen of them until afternoon when, about two o'clock, both birds appeared in the marsh on the eastern side of the canal. Mr. H. A. Purdie was now with me. He, Gilbert and I had the Bitterns under observation for more than an hour. During this time they rambled about over several acres of the lawn-like marsh keeping, for the most part, however, near the edge of the river here about one hundred and fifty yards in width. They indulged in no tilting on this occasion nor once approached each other nearer than thirty yards while not infrequently they

were more than twice that distance apart. As was the case yesterday they carried their bodies very low and at times so flattened to the ground that they resembled big, swift-crawling tortoises rather than birds, as they wound in and out among the tufts of grass for on this occasion they pursued devious courses which usually ended near the starting point. They did not seem to be looking for food but rather to be inspired by restlessness and also by a spirit of rivalry. As both "pumped" at frequent intervals I concluded that both must be males. There was much connected with their behavior which suggested that they were chiefly engaged in "showing off" apparently to each other, solely, for if there was a female anywhere near at hand we failed to see her. Whenever one of them "pumped" the other was sure to respond within two or three seconds, sometimes facing his rival, sometimes turning in another direction. During most of the time when they were in the marsh together both birds showed the white which we saw yesterday but when one of them finally flew away the other ceased altogether to display it although we had him in view for some twenty minutes longer during which time he "pumped" repeatedly. The white was seen much better and for a longer period to-day than yesterday and I was able to check, as well as supplement, my own observations by those of Purdie and Gilbert both of whom were with me the whole time and paying equally critical attention to the matter. At first we disagreed with respect to certain minor details but all such difference of opinion was finally harmonized and what I am about to record is now subscribed to by all three of us.

The white first appears at or very near the shoulders of the folded wings and then expands, sometimes rather quickly (never abruptly, however) but oftener very slowly until, spreading simultaneously from both sides, it forms two ruffs apparently almost if not quite equal in length and breadth to the hands of a large man but in shape more nearly resembling the wings of a grouse or quail held with the tips pointing sometimes nearly straight upward, sometimes more or less backward, also. As they rise above the shoulders these ruffs spread toward each other at right angles to the long axis of the bird's body until, at their bases, they nearly meet in the centre of the back. Sometimes they are held thus

without apparent change of area or position for many minutes at a time, during which the bird may move about over a considerable space or perhaps merely stand or crouch in the same place. We frequently saw them fully displayed when the Bitterns were "pumping" but not then more conspicuously, or in any different way, than at other times. When the bird was moving straight towards us with his body carried low and his ruffs fully expanded he looked like a big, white rooster having only the head and breast dark colored, the breast often looking nearly black. For in this aspect and at the distance at which we viewed him (perhaps two hundred yards) the broad ruffs, rising above and reaching well out on both sides of the back and shoulders, completely masked everything at their rear while the head and the shortened neck, being carried so low that they were seen only against the breast, added little or nothing to the visible area of dark plumage. When he was moving away from us in the same crouching attitude the ruffs looked exactly like two white wings — nearly as broad as those of a domestic Pigeon but less long — attached to either side of the back just above the shoulders. When we had a side view of him the outline of the ruffs was completely lost and there seemed to be a band of white as broad as one's hand, extending between the shoulders quite across the back. Thus whichever way he moved or faced the white was always shown, most conspicuously, however, when he turned towards us. It did not ever look dull or faint, or even yellowish, whether seen in bright sunlight, as on the morning of the 17th, or under dark lowering skies, as on the afternoon of the 18th. On the contrary, at all times and under all conditions, when we saw it at all, it appeared to be *pure* white. When the Bittern was rambling through short, rich-green grass or over blackish mud, the white was often the only thing we could see. It made an odd impression on the mind as it moved about without visible means of propulsion and had we not known just what it was we should certainly have been sorely puzzled to account for it. When the bird was standing or crouching motionless the white might easily have been mistaken for a small patch of snow or for a good-sized sheet of writing paper lying in the marsh. It was so very conspicuous that anyone looking out casually over the marsh could not have failed to notice it at the first glance. As

I have said it opened out rather slowly as a rule and never very abruptly. Its disappearance was effected in a correspondingly deliberate manner.

On reaching home late this afternoon I at once examined all the Bitterns in my collection. Most of them are females or males killed in autumn, none of which have pronounced white or whitish anywhere about the wings. But four adult males taken in spring possess tufts of yellowish white feathers, soft and more or less downy in texture, which are attached to the sides of the breast under the shoulders. By erecting and spreading these feathers I have been able to produce something resembling what we saw in Concord. The Concord birds, however, apparently had plumes *more than double* the size of those possessed by any of my skins and pure, not yellowish, white. When I gave an account of the matter at a meeting of the Nuttall Club this evening one of the members (Mr. Freeman) suggested that the Bittern may inflate the skin to which the plumes are attached, thus causing them to stand out further than they can be made to do in the dried skin. Even if this be so I doubt if feathers no longer or more numerous than those of my specimens could expand into the broad, full, snowy ruffs shown by the Bitterns seen yesterday and today at Concord. It is conceivable, of course, that the ruffs displayed by the living birds were less large and white than they appeared. I should suspect that this may have been the case were it not that the observations I have just noted were made with care by *five different persons* and under widely varying conditions of light and shade. Hence I have felt justified in recording our mutual impressions of what we saw despite the fact that my skins of Bitterns do not seem to altogether confirm them.

Concord, April 20, 1910. Clear and warm with fresh southwest wind.

I returned to Concord late this afternoon provided with a gun and determined to kill a Bittern if I could get a shot at one that showed white ruffs. Three males began pumping about six o'clock. Two of them were far out in the open meadows. The third, at the edge of the river, was accompanied by a smaller, duller plumaged bird which, without doubt, was a female and his mate. I watched this pair for more than half an hour. The male pumped at fre-

quent intervals but showed no white. The female was within twenty yards of him most of the time and for ten or fifteen minutes within three yards. He invariably faced her and she him when he was pumping but neither bird seemed in the least moved by sexual ardor or excitement or did anything especially suggestive of courtship. Indeed both behaved quite after the usual manner of their kind and altogether differently from the Bitterns seen on the 17th and 18th. When they walked it was with dignified slowness, carrying themselves rather erect and lifting and putting down their feet with marked deliberation. They crouched a few times over a pool of water remaining there for many minutes, evidently on the watch for prey, in poses closely similar to those assumed by Night Herons and Great Blue Herons when similarly engaged. Once the female plunged her head under water and drew out something which she first shook violently and then swallowed. Very much of the time she stood motionless with her bill pointing straight upward, her neck elongated and her body plumage so compressed that head, neck and body appeared all of about the same thickness and not much stouter than a man's wrist. When in this attitude she looked almost exactly like a stake, a yard or so in length, rising straight out of the marsh and of a weathered grayish color. The male did precisely the same thing but less often and for shorter periods. It was evident that both birds were apprehensive of danger of some kind and almost constantly on the watch for it. Indeed they seemed even more alert and suspicious than the Great Blue Heron or the Great White Egret often does, when seen under similar conditions. I was somewhat surprised at this and altogether delighted by their wonderful grace of form and movement. During the time I had them under observation they moved onward in a nearly straight course along the edge of the river but so very slowly that the total distance covered was less than forty yards. At length the male rose and flew down river two or three hundred yards. Although he pumped a number of times in this new station the female did not follow him.

Concord, April 21, 1910. Sunny but hazy; forenoon calm; fresh east wind in afternoon.

I spent almost the entire day watching Bitterns. There were two males pumping in the Great Meadows, sometimes within fifty

yards of one another, sometimes two hundred to three hundred yards apart. Whenever they approached one another they acted like the two seen on the 17th and 18th, crawling or gliding about over the meadow and showing their ruffs more or less constantly and conspicuously. One appeared to have small, yellowish ruffs, the other large, pure white ones. I tried in vain to get a shot at them. It was simply impossible to stalk them for there was no cover of any kind and they would not permit me to approach them nearer than one hundred yards before taking wing. They never once attempted to hide but merely stood looking at me until they thought I was getting dangerously close when they would fly to a distant part of the meadow, returning to their original stations whenever I went back to my canoe.

Among the members of the Nuttall Club present at the meeting when I gave an account of some of the observations above described was my friend and neighbor Mr. Charles R. Lamb. Shortly afterwards he visited Cape Cod to obtain a few shore birds for his collection. During this trip he had an opportunity of seeing a Bittern display its white ruffs and of examining them just after the bird was killed. He has since been kind enough to place at my disposal his written notes relating to this experience. Their testimony is, in part, as follows:—

“Late in the afternoon” of May 27, 1910, Mr. Lamb was sitting in a shooting stand in a marsh at East Orleans, Massachusetts, when he noticed a Bittern “about 100 to 150 yards” away, “standing very erect, with bill pointed up, looking like a stick.” Shortly after this it “lowered the feathers of the neck, bent the neck a little and started to walk off, at the same time throwing out the white feathers at the shoulder, over the wing. These feathers stood out straight from the body at first, then seemed to extend backward,” being “apparently all white” and forming “a conspicuous wing-shaped thing on the back above the wing, which looked about the size of” one’s “hand, possibly not quite as long.” As no other Bittern was in sight Mr. Lamb “could see no reason for the display of the white feathers unless it was due” to apprehension or alarm caused by his own presence. After watching the bird for several minutes he approached it by crawling on hands and knees through the grass and shot it, just as it took wing.

He "did not feel sure it was a Bittern until it flew" for its general coloring, "as seen through the glasses, looked dark bluish instead of brown." On examining this specimen just after killing it he found that the white feathers "appeared" to be attached "at the point where" the humerus enters "the body and as near the back as the breast." They "could easily be thrown out above the wing which was evidently done" by the living bird. On each side of the breast there were "about eight pure white feathers of a downy or fluffy quality and two or more nearly all white but with some brown near the shafts." This Bittern proved, on dissection, to be a male.

Since the above notes were made I have examined upwards of fifty skins of the American Bittern preserved in collections other than my own. On the strength of this and previous investigation I base the following generalizations respecting the light colored tufts of feathers which — for lack of a better name — I have called ruffs. (1) They are, as has been said, attached to the skin on each side of the breast near where the humerus enters the body and beneath the shoulder of the folded wing by which they are ordinarily concealed. (2) They are soft and fluffy in character and on the whole more nearly like down than like ordinary contour plumage although they often include typical feathers, rather large and well developed. (3) They vary in color from creamy white to light buffy or yellowish; the larger and broader feathers are commonly plain like the rest but sometimes they have narrow shaft stripes of rich reddish brown. (4) Although usually present in adult males killed in April, May or June they are entirely wanting or but very slightly developed in a few such birds — representing perhaps ten per cent of those which I have seen. (5) Autumnal specimens of both sexes and apparently all ages are almost, if not quite, invariably without them. (6) I have seen only one female (a breeding bird) which showed any traces (and these but slight) of them.

Concealed tufts of light-colored, downy plumage, similar in character and position to those just described and probably used in much the same manner for purposes of display, are worn by fully mature males of the South American Bittern, *Botaurus pinna-tus*. Two specimens of this species in the Museum of Comparative

Zoölogy have them pure white and better developed than in any example of *B. lentiginosus* that I have ever seen. They are less conspicuous and decidedly yellowish in a third bird belonging to the National Museum. I have failed to find obvious traces of them in the European Bittern (*B. stellaris*) but that may be merely because I have thus far seen no male of this species which was certainly adult and in full nuptial plumage. An allied species, the *Botaurus pæciloptilus* of Australia, New Caledonia and New Zealand, has hidden tufts of plumes situated like those of the American birds but made up more largely of true and fully developed feathers (there are downy ones also), yellowish brown in color with conspicuous darker markings. Whether or not these feathers are ever shown in the form of ruffs must remain doubtful until some one has settled the point by watching the living bird. I have found them only in what appear to be adult males, of which I have seen four or five.

When, in November last, extracts from the present paper were read by me at the meeting of the American Ornithologists' Union in Washington I was not aware that the possession, by the male Bittern, of white plumes ordinarily concealed but sometimes conspicuously shown in the form of ruffs had ever attracted the attention of any one prior to the time (April, 1910) when my observations were made at Concord. At the close of this meeting, however, Mr. Francis Harper (who attended it) informed me that he had seen a Bittern showing white some five years previous to the date of our conversation. He has since written me that he is "very sorry to find" that he has preserved only "exceedingly fragmentary" notes relating to his experience. It happened he states "in the Ithaca marshes," New York, "on May 11, 1905," when he "observed a most strange-looking Bittern with what appeared to be two white shoulder patches joined by a narrow strip over the back. The bird was skulking about in a clump of low cattails at a distance of about a hundred yards." Its white patches "appeared roughly circular and about four or five inches in diameter." They were not seen to "change in size" nor was it noticed "that they projected from the bird's body." Mr. Harper "was inclined then to consider this as merely a case of partial albinism."

I am still further indebted to Mr. Harper for calling my attention to an article on the Bittern by Agnes M. Learned which appeared in 'Bird-Lore' for May-June, 1908 (Vol. X, No. 3, pp. 106-108) and which contains the following interesting paragraph:—

"We were surprised and delighted, and went at once to our bird books to see what the beautiful white feathers were called; but, alas, not a book mentioned them! and later research at the library failed to reveal any information. Only one spoke of them and said that Bitterns did *not* wear nuptial plumes. After much thought, we decided that the Bittern must be like its relatives, the Egrets, and wear nuptial plumes. We thought that the white feathers, or plumes, grew from the region of the scapulars; there were several on each side, and they were not over five inches long and not less than three, and were soft and downy, and with the aid of a glass we could see them flutter in the light wind."

The passage just quoted is obviously and rather curiously incomplete for it stands apart by itself with nothing of kindred character preceding or following it. Perhaps there were originally additional sentences, leading up to and explaining it, which were inadvertently left out at the last moment, either by the author or by the printer. If so their omission was unfortunate for it mars the interest and value of what appears to have been the first published description of the white nuptial plumes of the American Bittern and of the manner in which they are displayed.